

CLAIMS

What is claimed is:

1. A method, comprising:

receiving an incoming multicast packet at a network device, the incoming multicast packet comprising an incoming multicast header and packet data;

storing the packet data at the network device;

generating a plurality of outgoing multicast headers based on the incoming multicast header; and

attaching each outgoing multicast header of the plurality of outgoing multicast headers to the packet data to create a plurality of outgoing multicast packets without making multiple copies of the packet data.

2. The method of claim 1, further comprising storing the packet data in a parent buffer of the network device.

3. The method of claim 2 wherein a parent metadata is associated with the parent buffer, the parent metadata to include a description of contents of the parent buffer.

4. The method of claim 1, further comprising:

creating a plurality of child buffers; and

loading the plurality of outgoing multicast headers into the plurality of child buffers.

5. The method of claim 4 wherein a plurality of child metadata are associated with the plurality of child buffers, each child metadata to describe the content of its respective associated child buffer.

6. The method of claim 5 wherein the plurality of child buffers and the plurality of child metadata are created by a copy block of the network device.

7. The method of claim 4, further comprising creating a reference count indicating the number of child buffers of the plurality of child buffers pointing to the parent buffer.

8. The method of claim 4, further comprising freeing a child buffer of the plurality of child buffers after an outgoing multicast packet of the plurality of outgoing multicast packets including the outgoing multicast header from the child buffer is forwarded by the network device.

9. The method of claim 8, further comprising updating the reference count to indicate the child buffer has been freed.

10. The method of claim 7, further comprising freeing the parent buffer when the reference count indicates there are no more child buffers.

11. The method of claim 1, further comprising receiving an incoming unicast packet by the network device, the incoming unicast packet to be processed similarly as the incoming multicast packet.

12. An article of manufacture, comprising:

a machine-readable medium including a plurality of instructions which when executed perform operations comprising:

receiving an incoming multicast packet at a router, the incoming multicast packet comprising packet data;

storing the packet data in a parent buffer of the router;

generating a plurality of outgoing multicast headers;

storing the plurality of outgoing multicast headers in a corresponding plurality of child buffers; and

repeatedly attaching an outgoing multicast header of the plurality of outgoing multicast headers to the packet data to create an outgoing multicast packet and transmitting the outgoing multicast packet until each outgoing multicast header of the plurality of outgoing multicast headers has been used.

13. The article of manufacture of claim 12 wherein the parent buffer is managed by a receiver of the router.

14. The article of manufacture of claim 12 wherein the plurality of child buffers are created by a copy block of the router.
15. The article of manufacture of claim 12 wherein execution of the plurality of instructions further perform operations comprising freeing a child buffer after the outgoing multicast header stored in the child buffer is transmitted in an outgoing multicast packet.
16. The article of manufacture of claim 15 wherein execution of the plurality of instructions further perform operations comprising updating a reference count to indicate the number of child buffers remaining.
17. The article of manufacture of claim 16 wherein the reference count is updated by a transmitter of the router.
18. The article of manufacture of claim 12 wherein execution of the plurality of instructions further perform operations comprising freeing the parent buffer after all outgoing multicast headers of the plurality of outgoing multicast headers have been used.
19. The article of manufacture of claim 12 wherein execution of the plurality of instructions further perform operations comprising receiving an incoming unicast

packet at the router, the incoming unicast packet to be processed similarly as the incoming multicast packet.

20. A network device, comprising:

- a receiver to receive an incoming multicast packet comprising packet data;
- a first memory unit coupled to the receiver, the first memory unit to store the packet data;
- a packet processing unit operatively coupled to the receiver, the packet processing unit to process unicast and multicast packets passing through the router;
- a copy block coupled to the packet processing unit, the copy block to manage a plurality of outgoing multicast headers stored in a second memory unit of the network device; and
- a transmitter operatively coupled to the packet processing unit.

21. The network device of claim 20 wherein the packet processing unit to attach an outgoing multicast header from the plurality of outgoing multicast headers to the packet data to create an outgoing multicast packet.

22. The network device of claim 21 wherein the transmitter to free a portion of the second memory unit storing the outgoing multicast header after the outgoing multicast packet is transmitted.

23. The network device of claim 22 wherein the transmitter to update a reference count after the outgoing multicast header is transmitted, the reference count indicating the number of outgoing multicast headers of the plurality of outgoing multicast headers to be transmitted in an outgoing multicast packet.

24. The network device of claim 20 wherein the copy block to generate the plurality of outgoing multicast headers based on an incoming multicast header of the incoming multicast packet.

25. The network device of claim 20 wherein the network device to process an incoming unicast packet along the same processing pipeline as the incoming multicast packet.

26. A system, comprising:

a network including a source host of a multicast group; and

a router communicatively coupled to the network, the router comprising:

a processor; and

a storage device operatively coupled to the processor, the storage device including a plurality of instructions which when executed by the processor perform operations comprising:

receiving an incoming multicast packet from the source host via the network, the incoming multicast packet comprising an incoming multicast header and packet data; and

storing the packet data in a memory device operatively coupled to the processor;

generating a plurality of outgoing multicast headers based on the incoming multicast header; and

attaching each outgoing multicast header of the plurality of outgoing multicast headers to the packet data to create a plurality of outgoing multicast packets without making multiple copies of the packet data.

27. The system of claim 26 wherein execution of the plurality of instructions further perform operations comprising forwarding the plurality of outgoing multicast packets.

28. The system of claim 26, further comprising a second network to receive an outgoing multicast packet of the plurality of outgoing multicast packets, the second network including a recipient host of the multicast group.